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EXAMINER

FETZNER, TIFFANY A

ART UNIT	PAPER NUMBER
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2859

DATE MAILED: 11/24/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/522,808

Applicant(s)

MOLYNEAUX ET AL.

Examiner

Tiffany A Feltner

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 June 2003 & 12 May 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17, 25, 26, 36-41 and 45-78 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-17, 25, 26, 36-41 and 45-78 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06/11/2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 13) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.
- a) ☐ The translation of the foreign language provisional application has been received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

Continued Prosecution Application

1. The request for a continued prosecution application (CPA) under 37 CFR 1.53(d) filed on [1] is acknowledged. 37 CFR 1.53(d)(1) was amended to provide that the CPA must be for a design patent and the prior application of the CPA must be a design application that is complete as defined by 37 CFR 1.51(b). See *Elimination of Continued Prosecution Application Practice as to Utility and Plant Patent Applications*, final rule, 68 *Fed. Reg.* 32376 (May 30, 2003), 1271 *Off. Gaz. Pat. Office* 143 (June 24, 2003). Since a CPA of this application is not permitted under 37 CFR 1.53(d)(1), the improper request for a CPA is being treated as a request for continued examination of this application under 37 CFR 1.114.

2. The request for CPA is being treated as a request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), which was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on **12 May 2003** has been entered.

3. Applicant request for suspension of action was processed on June 5th 2003, prior to the entry of the **12 May 2003** submission, therefore this first RCE action is being provided after the termination of applicant's request for suspension of action.

Canceled Claims

4. With respect to **claims 18-24** these claims are canceled as per applicant's May 12th 2003 preliminary CPA / RCE amendment.

5. With respect to **claims 27-35** these claims are canceled as per applicant's May 12th 2003 preliminary CPA / RCE amendment.
6. With respect to **claims 42-44** these claims are canceled as per applicant's May 12th 2003 preliminary CPA / RCE amendment.

Drawings

7. The objections to the drawings from the December 6th 2001 office action are **rescinded** in view of applicant's June 28th 2002 amendment response, which successfully overcomes the amendments without adding new matter.
8. The red-ink corrections to **figures 7 and 13** are approved by the examiner.

Claim Rejections - 35 USC § 112

9. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.
10. **Claims 38, and 45** recite the limitation "*a plurality* of RF coils " in **claims 38, and 45**, however applicant has removed the original antecedent basis for the "*plurality* of RF coils" by amending the claims to cover "at least five RF coils". Because applicant has not carried the amendment through the claim, therefore in the features where a "plurality" is used in reference to the RF coils there is insufficient antecedent basis for this limitation in these claims.

Claim Objections

11. **Claim 49** objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim, due to improper dependency, and possible duplication of an earlier claim. Applicant is required to

cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

12. With respect to **claim 49**, "The configuration according to claim 49, wherein each of said pair of coils, said single coil, and each of said at least additional pairs of coils lie in planes parallel to each other." This claim is objected to for improper dependency, because claim 49 cannot depend from claim 49, the examiner in interpreting **claim 49** as depending from **claim 37**, because if the claim depended from **claim 36**, it would be a duplicate of **claim 47**. "The configuration according to claim 49, wherein each of said pair of coils, said single coil, and each of said at least additional pairs of coils lie in planes parallel to each other.

Claim Rejections - 35 USC § 102

13. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

14. **Claims 1-11, 13-17, 25, 26, 36-41, 45-63 and 65-78** are rejected under **35**

U.S.C. 102(e) as being anticipated by **Su et al.**, US patent 6,493,572 B1 issued

December 10th 2002, with an effective filing date under **35 U.S.C. 102(e)** of September 30th 1999.

15. With respect to **currently amended coil configuration claim 1**, and corresponding **currently amended method claim 41**, **Su et al.**, shows and teaches “A coil configuration/method for a magnetic resonance imaging system, comprising: a pair of coils in an opposite rotation orientation associated with a first magnetic field in a region of interest, wherein the region of interest is essentially within a cylinder created by the pair of coils;” [See abstract; figure 13 which shows a schematic for an MRI system; col. 6 lines 33-34; col. 12 lines 10-53; col. 6 lines 38-68 and figure 1 where coils 1 are shown and taught to be wound in an opposite rotation orientation for component 1a and 1b]. **Su et al.**, shows and teaches “a single coil” [See component 2 in figure 1] “associated with a second magnetic field in the region of interest, wherein the first magnetic field and the second magnetic field are substantially parallel in the region of interest, wherein the single coil is positioned at an essentially zero-flux contour with respect to the first magnetic field” [See figures 1, 3a, 3b, 8; abstract; col. 4 line 56 through col. 5 line 48; col. 6 line 38-68; col. 8 lines 1-54; col. 10 lines 24-45].

16. With respect to **New claim 51**, **Su et al.**, shows and teaches “A method of detecting magnetic fields in a magnetic resonance imaging system, comprising: positioning a pair of coils in an opposite rotation orientation” [See abstract, figures 1, 3a, 3b, 4, 8, 13; Figure 13 shows a schematic for an MRI system; col. 6 lines 33-34; col. 12 lines 10-53; col. 6 lines 38-68 and figure 1 where coils 1 are shown and taught to be wound in an opposite rotation orientation for component 1a and 1b]; “wherein the pair of coils are associated with a first magnetic field in a region of interest, wherein the region of interest is essentially within a cylinder created by the pair of coils; positioning a single

coil at an essentially zero-flux contour with respect to the first magnetic field, wherein the single coil is associated with a second magnetic field in the region of interest; detecting the first magnetic field with the pair of coils; and detecting the second magnetic field with the single coil.” [See figures 1, 3a, 3b, 8; abstract; col. 4 line 56 through col. 5 line 48; col. 6 line 38-68; col. 8 lines 1-54; col. 10 lines 24-45] The same reasons for rejection, that apply to **amended claim 1** also apply to **New method claim 51**.

17. With respect to **claim 2 Su et al.**, shows and teaches “a means for utilizing” (i.e. radio frequency receiving unit 60, control unit 90, signal processing unit 70, each “utilize” a component or aspect of the **Su et al.**, RF coil array component 61) “the pair of coils” (i.e. the components 1a and 1b of figure 1) “for *detecting* the first magnetic field;” [See abstract] “and a means for utilizing the single coil” (i.e. component 2 of Figure 1) at the point where the opposing fields are nullified “for *detecting* the second magnetic field.” [See abstract; col. 4 line 56 through col. 5 line 48; col. 6 line 38 through col. 8 line 54; col. 10 lines 24-45; col. 12 lines 10-53; figures 1, 2a-2e, 3a, 3b, 8, and 13] The same reasons for rejection, that apply to **amended claim 1** also apply to **claim 2**.

18. With respect to **claim 3 Su et al.**, shows and teaches “a means for utilizing the pair of coils for *generating* the first magnetic field; and a means for utilizing the single coil for generating the second magnetic field.” [See radio frequency transmitting unit 50, control unit 90, and signal processing unit 70, which each “utilize” a component or aspect of the **Su et al.**, RF coil array component 61, “for generating the first magnetic field;” and also provide the “means for utilizing the single coil for generating the second

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magnetic field.” Additionally see figure 13, the abstract; and col. 12 lines 10-53] The same reasons for rejection, that apply to **amended claim 1** also apply to **claim 3**.

19. With respect to **claim 4 Su et al.**, shows and teaches “a means for utilizing the pair of coils for *generating* the first magnetic field; and a means for utilizing the single coil for generating the second magnetic field.” [See radio frequency transmitting unit 50, control unit 90, and signal processing unit 70, which each “utilize” a component or aspect of the **Su et al.**, RF coil array component 61, “for generating the first magnetic field;” and also provide the “means for utilizing the single coil for generating the second magnetic field.” Additionally see figure 13, the abstract; and col. 12 lines 10-53] The same reasons for rejection, that apply to **claims 1, 2** also apply to **claim 4**.

20. With respect to **claim 5 Su et al.**, shows “said coils of said pair of coils and said single coil are selected from the group consisting of a single turn loop” [See Figure 1] “a multiturn solenoid wound as series loops” [See Figures 5, 7a, 7b], “and a multiturn solenoid wound as parallel loops” [See Figures 5, 7a, 7b, 1, 8] The same reasons for rejection, that apply to **claims 1, 2** also apply to **claim 5**.

21. With respect to **claim 6 Su et al.**, shows each of said pair of coils and said single coil lie in planes parallel to each other”, [See Figures 1, 3a, 3b, 6, 7a, 7b, 8] and **Su et al.**, shows and teaches that “said essentially zero-flux contour is an essentially zero-flux plane” [See figures 3b, and 2d col. 7 line 1 through col. 8 line 54, especially col. 7 lines 53-57 and col. 8 lines 29-43]. The same reasons for rejection, that apply to **amended claim 1** also apply to **claim 6**.

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22. With respect to **currently amended claim 7 Su et al.**, shows and teaches that “the pair of coils and the single coil are co-axial.” [See figure 1, 3a, 3b, 6, 7b, 8; abstract; col. 5 lines 3-13] The same reasons for rejection, that apply to **claims 1, 6** also apply to **claim 7**.

23. With respect to **claim 8** and **corresponding new method claim 60**, which depends from **claim 51, Su et al.**, shows and teaches that “the single coil is a first channel” [See figures 8, 9a, 9b, 9c; col. 11 lines 2-27] “and the pair of coils is a second channel” [See figures 8, 9a, 9b, 9c; col. 11 lines 2-27] **Su et al.**, also teaches that the “coupling between the first channel and second channel is low.” [See col. 11 lines 28-42; Figures 10a-10c; col.5 lines 10-13 where **Su et al.**, teaches that the arrangement of the coils inherently decouples the coils from one another, which implies intrinsically that the coupling is low to non-existent.] The same reasons for rejection, that apply to **claims 1, 2, 51** also apply to **claims 8, 60**.

24. With respect to **claim 9** and **corresponding new method claim 61**, which depends from **claim 51, Su et al.**, shows and teaches that the “coupling between the first channel and second channel is approximately zero” because **Su et al.**, teaches that the arrangement of the coils inherently decouples the coils from one another, which implies intrinsically that the coupling is low to non-existent. [See col. 11 lines 2-42; Figures 2d, 3b; 9a, 9b, 9c, 10a-10c; col.5 lines 10-13; abstract]. The same reasons for rejection, that apply to **claims 1, 2, 8, 51, 60** also apply to **claims 9, 61**.

25. With respect to **currently amended claim 10** and **corresponding new method claim 62**, which depends from **claim 51, Su et al.**, shows that “the zero-flux contour is

located between the pair of coils" [See figures 2d, 3b; col. 7 line 1 through col. 8 line 54, especially col. 7 lines 53-57 and col. 8 lines 29-43]. The same reasons for rejection, that apply to **amended claim 1** and **new claim 51** also apply to **claims 10, 62**.

26. With respect to **currently amended claim 11** and **corresponding new method claim 63**, which depends from **claim 51, Su et al.**, shows that "the zero-flux contour is located outside" and above the cylinder defined by "the pair of coils." [See figure 4] The same reasons for rejection, that apply to **amended claim 1** and **new claim 51**, also apply to **claims 11, 63**.

27. With respect to **claim 13** and **corresponding new method claim 65**, which depends from **claim 51, Su et al.**, shows and teaches that the "single coil is positioned approximately equidistance from each of the pair of coils". [See Figures 1, 3a, 3b, 8; col. 5 lines 3-13 where the fact that coils 1a and 1b are coaxial and of equal diameter geometrically requires the "single coil" to be "positioned approximately equidistance from each of the pair of coils"]. The same reasons for rejection, that apply to **claims 1, 10, 51, 62** also apply to **claims 13, 65**.

28. With respect to **claim 14** and **corresponding new method claim 66**, which depends from **claim 51, Su et al.**, shows from figure 6 that "the single coil is positioned closer to one of the coils of the pair of coils than to the other", because coil 2 is closer to coil component 1a and farther from coil component 1b. [See figure 6] The same reasons for rejection, that apply to **claims 1, 10, 51, 62** also apply to **claims 14, 66**.

29. With respect to **claim 15** and **corresponding new method claim 67**, which depends from **claim 51, Su et al.**, shows "at least one Helmholtz coil pair" (i.e.

component 3 of figure 8 is a coil pair in a conventional saddle shaped Helmholtz configuration) "associated with a third magnetic field essentially orthogonal to the first and second magnetic fields in the region of interest." [See Figure 8] .The examiner also notes that component 1 in figure 1 as shown illustrates a coil pair in a conventional planar Helmholtz configuration). The same reasons for rejection, that apply to **amended claim 1**, and **new claim 51** also apply to **claims 15, 67**.

30. With respect to **claim 16** and **corresponding new method claim 68**, which depends from **claim 51, Su et al.**, shows and teaches "a means for utilizing" (i.e. via radio frequency transmitting unit 50, RF receiving unit 60, control unit 90, and signal processing unit 70) "said at least one Helmholtz coil pair for generating the third magnetic field", because component 3 of figure 8 is a coil pair in a conventional saddle shaped Helmholtz configuration, and component 3 (i.e. SSAC component 61 in figure 13) is responsible for the generating/detecting "the third magnetic field", via radio frequency transmitting unit 50, RF receiving unit 60, control unit 90, and signal processing unit 70). [See figures 8, 13; col. 12 lines 10-54 The same reasons for rejection, that apply to **claims 1, 15, 51, 67** and **New claim 51** also apply to **claims 16, 68**.

31. With respect to **claim 17** and **corresponding new method claim 69**, which depends from **claim 51, Su et al.**, shows that "said Helmholtz coil pair is of a configuration selected from the group consisting of large loops, top/bottom loops, side by side loops, and a combination thereof" [See col. 5 lines 3-48; figures 8; 6, 4, 5 and

the abstract]. 54 The same reasons for rejection, that apply to **claims 1, 15, 51, 67** and **New claim 51** also apply to **claims 17, 69**.

32. With respect to **claim 25** and **corresponding new method claim 70**, which depends from **claim 51, Su et al.**, shows that "said pairs of coil are connected together by a pair of electrical conductors to form an Alderman-Grant coil pair." [See Figures 7a and 7b; col. 10 lines 1-23] The same reasons for rejection, that apply to **amended claim 1**, and **New claim 51** also apply to **claims 25, 70**.

33. With respect to **claim 26**, and **corresponding new method claim 71**, which depends from **claim 51, Su et al.**, shows and teaches "a switching means" [See Figures 9a, 9b where the 90 degree hybrid combiner is a switching means; col. 11 lines 2-42; and figure 13 because the hybrid combiner is a component of signal processing component 70] "for allowing the pair of coils and the single coil to operate in and switch between two or more of the modes in the group consisting of (i) the coils of the pair of coils and the single coil having currents rotating in the same direction;" [See Figure 3a] "(ii) the coils of the pair of coils having currents rotating in the same direction, with the single coil operating independently;" [See Figure 3a] "(iii) the coils of the pair of coils having currents rotating in opposite directions, with the single coil operating independently;" [See Figure 3b] "and (iv) the coils of the pair of coils having currents rotating in the same direction and the single coil having a current rotating in an opposite direction with respect to the currents of the pair of coils." [See Figure 3a]. The same reasons for rejection, that apply to **amended claim 1** also apply to **claim 26**.

34. With respect to **claim 36**, and **corresponding new method claim 72**, which depends from **claim 51**, **Su et al.**, shows and teaches “at least one additional pair of coils” (i.e. the pair of coils that comprise component 3 of figure 8), “wherein said pair of coils” (i.e. the coils that comprise component 1 in figure 8 or components 1a and 1b in figures 1, 3a, and 3b) are “in an opposite orientation” and have “odd symmetry with respect to a plane” (i.e. interpreted by the examiner as ‘on one side of the plane current flows in one direction, and on the other side of the plane current flows in a second direction’), “wherein each of said at least one additional pair of coils” (i.e. the pair of coils that comprise component 3 of figure 8), is associated with a corresponding at least one additional magnetic field” (i.e. each coil, winding or turn has an associated magnetic field when a current flows automatically, therefore this limitation is met by the arrows which indicate a flowing current / EM field), “wherein each of said at least one additional pair of coils has even symmetry with respect to the plane and is associated with one of said at least one additional magnetic field” [See Figure 8] “such that said single coil is a first channel, said pair of coils in an opposite orientation is a second channel, and each of said at least one additional pair of coils is an additional channel which is orthogonal to the first channel, second channel, and each of the other additional channels.” [See figures 1, 3a, 3b, 8, 9a, 9b, 9c; col. 10 line 24 through col. 11 line 42] The same reasons for rejection, that apply to **amended claim 1**, and **New claim 51** also apply to **claims 36**, and **72**.

35. With respect to **claim 37** and **corresponding new method claim 75**, which depends from **claim 51**, **Su et al.**, shows and teaches “at least one additional pair of

coils" [See the coils that make up component 1b in figure 5], "wherein said pair of coils" [See the coils that make up component 1b in figure 5] are "in an opposite orientation" [the current in 1a is in an opposite direction to the orientation of the current flow in the pair of coils of 1b in Figure 5] **and** "has odd symmetry with respect to a plane" [See figure 5], "wherein each of said at least one additional pair of coils is associated with a corresponding at least one additional magnetic field" (i.e. each coil, winding or turn has an associated magnetic field when a current flows automatically, therefore this limitation is met by the arrows which indicate a flowing current / EM field), "wherein each of said at least one additional pair of coils has odd symmetry with respect to the plane" [See figure 5] "and is associated with one of said at least one additional magnetic field such that said single coil is a first channel, said pair of coils in an opposite orientation is a second channel, and each of said at least one additional pair of coils is an additional channel which is orthogonal to the first channel, second channel, and each of the other additional channels." [See figures 5, 9a, 9b, 9c; col. 9 lines 17-43; col. 10 line 63 through col. 11 line 42] The same reasons for rejection, that apply to **claims 1, 51, 54, 57** also apply to **claims 37, 75**.

36. With respect to **currently amended claim 38 Su et al.**, shows and teaches "A RF coil configuration for a magnetic resonance imaging system, comprising: at least five RF coils with bilateral symmetry" [See Figure 7a], "wherein the at least five RF coils are coaxial", [See Figure 7a], "wherein said *plurality* of RF coils is associated with a plurality of modes such that the number of modes is less than or equal to the number of RF coils, wherein said plurality of modes correspond with a plurality of current patterns,

each of said plurality of current patterns having zero net mutual inductive coupling to each of the other of said plurality of current patterns in a region of interest.” [See col. 10 line 1 through col. 12 line 54; Figure 13; figure 7a; abstract] The same reasons for rejection, that apply to **amended claim 1** also apply to **amended claim 38**.

37. With respect to **previously amended claim 39 Su et al.**, shows and teaches “a means for utilizing the plurality of RF coils for detecting magnetic fields associated with the plurality of current patterns” [See col. 10 line 1 through col. 12 line 54; Figure 13; Figure 9a, 9b, 9c figure 7a; col. 5 lines 44-48; abstract] The same reasons for rejection, that apply to **amended claims 1, 38** also apply to **claim 39**.

38. With respect to **previously amended claim 40 Su et al.**, shows and teaches “a means for utilizing the plurality of RF coils for generating magnetic fields associated with the plurality of current patterns.” [See col. 10 line 1 through col. 12 line 54; Figure 13; Figure 9a, 9b, 9c figure 7a; col. 5 lines 44-48; abstract] The same reasons for rejection, that apply to **amended claims 1, 38** also apply to **claim 40**.

39. With respect to **currently amended claim 45 Su et al.**, shows and teaches “A method of detecting magnetic fields in a magnetic resonance imaging system” [See figure 13, abstract, figures 9a, 9b, 9c], “comprising the following steps positioning at least five RF coils coaxially with respect to a region of interest” [See Figure 7a] “such that the *plurality* of RF coils support a plurality of modes corresponding to a plurality of current patterns; and detecting the plurality of modes associated with the plurality of RF coils, wherein the number of RF coils is greater than or equal to the number of modes, and wherein each of the plurality of current patterns has zero net mutual inductive

coupling to each of the other of the plurality of current patterns in a region of interest.”

[See col. 10 line 1 through col. 12 line 54; Figure 13; figure 7a; abstract] The same reasons for rejection, that apply to **amended claims 1, 38** also apply to **amended claim 45**.

40. With respect to **new claim 46 Su et al.**, teaches and shows that “the pair of coils and single coil are positioned with respect to an external static magnetic field such that the direction of the external static magnetic field is perpendicular to the axis of the cylinder created by the pair of coils.” [See figure 13, figure 1, 3a, 3b, 4 abstract; col. 4 line 41 through col. 5 line 2; col. 12 lines 10-54] The same reasons for rejection, that apply to **amended claim 1**, also apply to **claim 46**.

41. With respect to **new claim 47** and **corresponding new method claim 73**, which depends from **claim 51, Su et al.**, shows that “each of said pair of coils” (i.e. component 1 of figure 8), and “said single coil” (i.e. component 2 of figure 8), “lie in planes parallel to each other;” **Su et al.**, also shows that “each of said at least additional pairs of coils lie in planes parallel to each other.” (i.e. component 3 of figure 8). Figure 8 meets the limitations of claim 47 because applicant requires only that the planes of each respective pair, are parallel to the coils which make up that particular type of coil pair. The same reasons for rejection, that apply to **claims 1, 36, 51** also apply to **claims 47, 73**.

42. With respect to **new claim 48** and **corresponding new method claim 74**, which depends from **claim 51, Su et al.**, shows that “each of said pair of coils” (i.e. component 1 of figure 8), and “said single coil” (i.e. component 2 of figure 8), are coaxial. **Su et al.**,

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also shows that "each of said at least additional pairs of coils are coaxial." (i.e. component 3 of figure 8). Figure 8 meets the limitations of claim 48 because applicant requires only that the planes of each respective pair, are coaxial to the coils which make up that particular type of coil pair, therefore the same reasons for rejection, that apply to **claims 1, 36, 47, 51, 72, 73** also apply to **claims 48, 74**.

43. With respect to **new claim 49** and **corresponding new method claim 76**, which depends from **claims 51, 54, 57 and 75, Su et al.**, teaches and shows that "each of said pair of coils, said single coil, and each of said at least additional pairs of coils lie in planes parallel to each other." [See Figure 5]. The same reasons for rejection, that apply to **claims 1, 37, 51, 54, 57, 75** also apply to **claim 49, 76**.

44. With respect to **new claim 50**, and **corresponding new method claim 77**, which depends from **claims 51, 54, 57, 75, and 76, Su et al.**, shows that "each of said pair of coils, said single coil, and each of said at least additional pairs of coils are coaxial." [See Figure 5] The same reasons for rejection, that apply to **amended claims 1, 37, 51, 54, 57, 75, 76** also apply to **claims 50, 77**.

45. With respect to **new claim 52, Su et al.**, shows and teaches the step of "positioning the pair of coils with respect to an external static magnetic field such that the direction of the external static magnetic field is perpendicular to the axis of the cylinder created by the pair of coils." [See Figure 13, abstract, col. 12 lines 10-54; col. 4 lines 10-22; col. 4 lines 41 through col. 5 line 2] The same reasons for rejection, that apply to **amended claim 1**, and **new claim 51** also apply to **new claim 52**.

46. With respect to **new claim 53, Su et al.**, shows and teaches the step of “positioning the pair of coils with respect to an external static magnetic field comprises positioning the pair of coils with respect to a vertical external static magnetic field.” [See Figure 13, abstract, col. 12 lines 10-54; col. 4 lines 10-22; col. 4 lines 41 through col. 5 line 2] The same reasons for rejection, that apply to **amended claim 1**, and **new claims 51, 52** also apply to **new claim 53**.

47. With respect to **new claim 54, Su et al.**, shows and teaches the step of “positioning an object to be imaged in the region of interest.” [See Figures 13, 4, 6, 7a, abstract, col. 12 lines 10-54; col. 4 lines 10-22; col. 4 lines 41 through col. 5 line 2; col. 5 lines 23-30; col. 8 line 55 through col. 9 line 16; col. 9 lines 48-67] The same reasons for rejection, that apply to **amended claim 1**, and **new claim 51** also apply to **new claim 54**.

48. With respect to **new claim 55, Su et al.**, shows and teaches the step of “positioning an object to be imaged such that at least a portion of the object is in the essentially zero-flux contour with respect to the first magnetic field.” [See Figures 13, 4, 6, 7a, abstract, col. 12 lines 10-54; col. 4 lines 10-22; col. 4 lines 41 through col. 5 line 2; col. 5 lines 23-30; col. 8 line 55 through col. 9 line 16; col. 9 lines 48-67] The same reasons for rejection, that apply to **amended claim 1**, and **new claim 51** also apply to **new claim 55**.

49. With respect to **new claim 56, Su et al.**, shows and teaches that “each of said pair of coils and said single coil lie in planes parallel to each other, and wherein said essentially zero-flux contour is an essentially zero-flux plane, wherein positioning an

object to be imaged in the region of interest comprises positioning an object to be imaged such that at least a portion of the object is in the essentially zero-flux plane.”

[See figures 3b, and 2d col. 7 line 1 through col. 8 line 54, especially col. 7 lines 53-57 and col. 8 lines 29-43]. The same reasons for rejection, that apply to **amended claim 1**, **6**, and **new claims 51, 55** also apply to **new claim 56**.

50. With respect to **new claim 57, Su et al.**, shows that “positioning an object to be imaged in the region of interest comprises inserting at least a portion of the object to be imaged into the region of interest through one of the pair of coils.” [See figure 6] The same reasons for rejection, that apply to **amended claim 1**, and **new claims 51, 54** also apply to **new claim 57**.

51. With respect to **new claim 58, Su et al.**, shows that “positioning an object to be imaged in the region of interest further comprises inserting at least a portion of the at least a portion of the object to be imaged through the single coil.” [See figures 6, 4] The same reasons for rejection, that apply to **amended claim 1**, and **new claims 51, 54, 57** also apply to **new claim 58**.

52. With respect to **new claim 59, Su et al.**, teaches and shows the step of “generating the first magnetic field with the pair of coils; and generating the second magnetic field with the single coil.” [See figure 13, the abstract; and col. 12 lines 10-53; col. 7 lines 1-68] The same reasons for rejection, that apply to **amended claim 1, 3**, and **new claims 51**, also apply to **new claim 59**.

53. With respect to **currently amended claim 78 Su et al.**, shows and teaches “A RF coil configuration for a magnetic resonance imaging system, comprising: positioning

a plurality of coils with bilateral symmetry," [See Figures 7a, 8, 1, 3a, 3b,], "wherein said *plurality* of RF coils is associated with a plurality of modes such that the number of modes is less than or equal to the number of RF coils, wherein said plurality of modes correspond with a plurality of current patterns, each of said plurality of current patterns having zero net mutual inductive coupling to each of the other of said plurality of current patterns in a region of interest." [See col. 10 line 1 through col. 12 line 54; Figure 13; figure 7a; abstract] The same reasons for rejection, that apply to **claims 1, 38** also apply to **amended claim 78**.

Claim Rejections - 35 USC § 103

54. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

55. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

56. **Claims 12 and 64** are rejected under **35 U.S.C. 103(a)** as being unpatentable over **Su et al.**, US patent 6,493,572 B1 issued December 10th 2002, with an effective filing date of September 30th 1999.

57. With respect to **currently amended claim 12** and **corresponding new method claim 64**, which depends from **claim 51, Su et al.**, lacks directly teaching or showing that "a second zero-flux contour with respect to the first magnetic field is located outside the pair of coils, further comprising a second single coil for generating a third magnetic field in the region of interest, wherein the second single coil is positioned at the second zero-flux contour with respect to the first magnetic field." However It would have been obvious to one of ordinary skill in the art at the time that the invention was made that the coil configuration of figure 4 can be duplicated, because normally a female patient has two breasts, so the capability of imaging both breasts simultaneously would be a readily recognizable advantage/modification of the **Su et al.**, reference. Additionally, **Su et al.**, teaches being able to image more than one anatomical feature at once. [See col. 9 lines 17-67]

58. It would also have been obvious to one of ordinary skill in the art at the time that the invention was made that the invention was made that in the **Su et al.**, invention when multiple regions of the body are being imaged by two SSAC RF coil configurations, at the same time, as taught by **Su et al.**, that "a second zero-flux contour with respect to the first magnetic field" "located outside the pair of coils, further comprising a second single coil for generating a third magnetic field in the region of interest, wherein the second single coil is positioned at the second zero-flux contour with respect to the first magnetic field" would be the automatic, implicit, and intrinsic result of expanding Figure 4, to include both the left and right breast of a patient. (i.e. In the configuration shown in figure 4, a patient's left breast is examined. The examiner

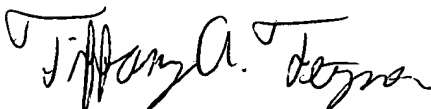
considers it readily obvious to an individual of ordinary skill in the art that a second coil configuration is also used within the scope of the **Su et al.**, teachings to image the right breast; and subsequently two sets of coil components 1a, 1b, and 2 would also be used, for the right breast, which would necessarily satisfy the requirements of configuration **claim 12** and method **claim 64**.) The same reasons for rejection, that apply to **claims 1, 10, 51, 63** also apply to **claims 12, 64**.

Conclusion

59. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tiffany Fetzner whose telephone number is (703) 305-0430. The examiner can normally be reached on Monday-Thursday from 7:00am to 4:30pm., and on alternate Friday's from 7:00am to 3:30pm.

60. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez, can be reached on (703) 308-3875. The fax phone number for the organization where this application or proceeding is assigned is (703)305-3432 .

61. Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-0956.



TAF

November 14, 2003



Diego Gutierrez

Supervisory Patent Examiner

Technology Center 2800